

TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT

SMALL SAMPLE CALORIMETRY CAPABILITIES

Identification No.: RL-01-018-NM

Date: September 2000

Program: Nuclear Materials Stabilization

OPS Office/Site: Richland Operations Office/Hanford Site

PBS No.: RL-CP03

Waste Stream: N/A

TSD Title: N/A

Operable Unit (if applicable): N/A

Waste Management Unit (if applicable): N/A

Facility: Plutonium Finishing Plant

Priority Rating:

This entry addresses the "Accelerated Cleanup: Paths to Closure (ACPC)" Priority:

- ☐ 1. Critical to the success of the ACPC
- ☒ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high lifecycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays)
- ☐ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

Need Title: Small Sample Calorimetry Capabilities

Need/Opportunity Category: *Technology Opportunity*

Need Description: A small sample calorimeter would provide a more accurate and potentially quicker method of determining plutonium content. Typical samples are in the range of 10 to 30 grams and provide an efficient means of attaining characterization data on feed and stabilized SNM items. The use of calorimetry has advantages in handling, accuracy and elimination of waste streams associated with other analytical methods. The primary use would be to support stabilization processing and subsequent terminal cleanout activities.

Schedule Requirements: This technology is needed as soon as possible to attain the maximum benefit, but can contribute to cost savings and potential schedule acceleration anytime before FY 2010.

Earliest Date Required: 09/2000

Latest Date Required: FY 2005 or beyond

Problem Description: Current analysis for the plutonium content of small samples is done primarily through destructive analysis techniques, though a fraction are measured by NDA counting. The destructive method generates volumes of waste that require disposal. In addition the method has proved to be subject to interferences for several of the materials being processed in the PFP stabilization efforts. A small sample calorimeter would provide a more accurate and potentially quicker method of determining plutonium content.

Potential Life-Cycle Cost Savings of Need (in \$000s) and Cost Savings Explanation: The cost savings for this technology would primarily be associated with time savings in counting, and avoidance of wet chemistry dose and associated waste costs. A specific cost savings is difficult to quantify, but a ROM estimate would be between \$0.5 and \$1.5 million.

Benefit to the Project Baseline of Filling Need: Quicker, more accurate determination of plutonium content of solid samples. Ability to analyze materials which interfere with current analysis method.

Relevant PBS Milestone: TRP-14-401, Complete PFP Deactivation, 9/30/16

Functional Performance Requirements: Technology must be sufficient to determine plutonium contents of 1% to 99% in small (10g) samples, accounting for the effects of impurities and interferences.

Work Breakdown Structure (WBS) No.:	TIP No.:
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1.04.05.01.15	N/A
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Justification For Need:

Technical: A small sample calorimeter provides an alternative method for plutonium characterization of solids without wet chemistry or less accurate counting methods being employed.

Regulatory: None.

Environmental Safety & Health: None.

Cultural/Stakeholder Concerns: None.

Other: N/A

Current Baseline Technology: Wet chemistry to separate and quantify the plutonium content, or solution counting with NDA equipment.

End-User: Fluor Hanford, Inc., Nuclear Materials Stabilization Project

Contractor Facility/Project Manager: George W. Jackson, Director, Nuclear Materials Stabilization Project, Fluor Hanford, Inc. (509) 373-6622

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